(No Model.)

E. E. RIES.

ELECTRIC CURRENT REGULATOR.

No. 515,970. Patented Mar. 6, 1894.

Fig.1.

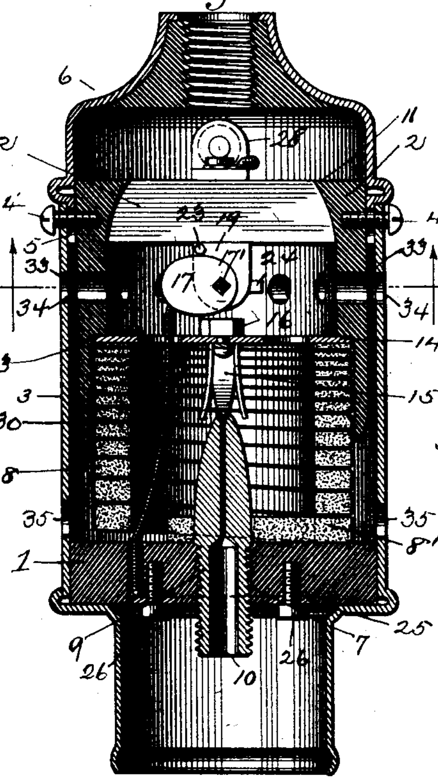


Fig.2.

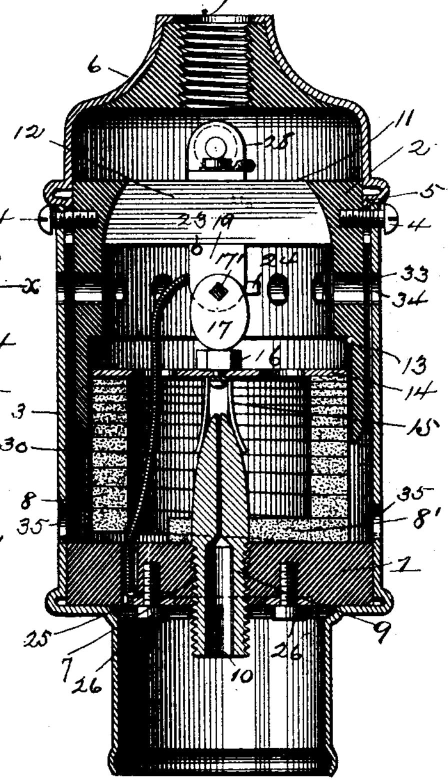


Fig.3.

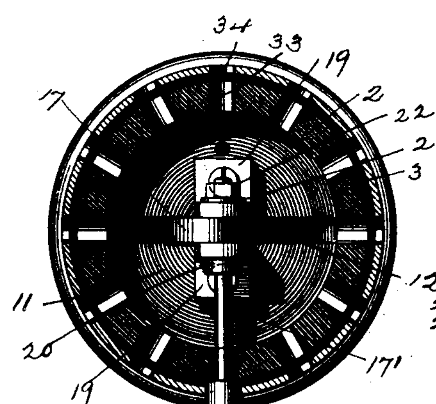
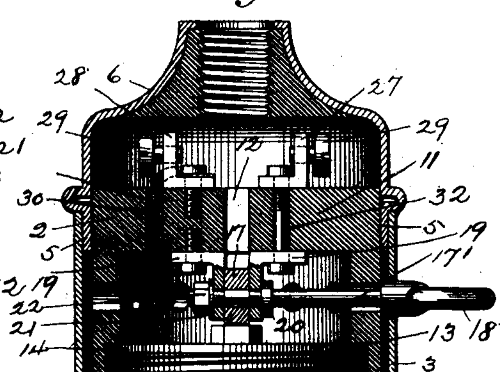


Fig.4.



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ELIAS E. RIES, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE RIES ELECTRIC SPECIALTY COMPANY, OF SAME PLACE.

ELECTRIC-CURRENT REGULATOR.

SPECIFICATION forming part of Letters Patent No. 515,970, dated March 6, 1894.

Application filed February 2, 1893. Serial No. 460,663. (No model.)

To all whom it may concern:

Be it known that I, ELIAS E. RIES, a citizen of the United States, and a resident of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Electric-Current Regulators, of which the following is a specification.

My invention has reference to regulating sockets or holders for electrical transmitting devices, and more especially for incandescent electric lamps, the object of the invention being to produce a device housed in the socket or holder for regulating the current to the translating device, by variations of the external resistance of the same. With the present invention this is accomplished by a helical rheostat, the different portions of which may be short circuited upon each other by insensible degrees, or the whole of which may be short circuited by metallic conductors all by the action of the key which in other sockets is merely used for the purpose of turning on and off the current entirely. By my invention the current to the lamp may be turned on so faintly that the lamp filament becomes barely visible in the dark, and the incandescence of the filament can then be raised to its maximum by insensible degrees, thus enabling the user to use the lamp in all possible stages of brightness, and therefore only consume a proportionate amount of current. The manner in which this is accomplished will appear from the following detailed description with reference to the accompanying drawings in which I have illustrated one of the forms which my invention may assume as follows:

Figure 1, represents a vertical central section of my improved lamp socket, representing the condition when the lamp circuit is open. Fig. 2, is a like view of the lamp socket, in the condition when the circuit is closed, and the rheostat is short-circuited. Fig. 3, is a cross-section on the line x—x of Fig. 1, looking in the direction of the arrow indicated, and Fig. 4, is a central vertical section of the upper portion of the socket, at right angles to the view shown in Fig. 1.

Like numerals of reference indicate like parts all throughout the drawings.

The body of the socket is composed of two blocks 1, 2, of insulating material, such as wood, vulcanized fiber, &c., and a shell 3, of spun metal, connecting the two blocks by screws 4, 4. This shell closely fits the block 1, while the block 2 is made smaller than the upper end of the shell so that there is a space between this block and the inner wall of the shell, and into this space enters the rim 5 of the detachable fixture coupling 6, the rim having formed in it, on diametrically opposite sides, slots, which, together with the shanks of the screws 4, constitute bayonet joints. The lower block or disk 1 has a central screw-threaded perforation 7, and is otherwise shaped to receive the contact terminals of the socket as will appear farther on. In the interior of the shell is arranged a helical or helico spiral spring 8, of a high resistance conductor, which may be an alloy of suitable metals, but which by preference is made of carbon. This spring, which forms the rheostat of my device, may be made cylindrical in general outline as shown, and the turns of the helix are of gradually increasing thickness from the upper end to the lower, so that when the helix is compressed the upper convolutions will come in contact first, and as the compression is increased the lower convolutions will come in contact; and if this helix is made a part of an electric circuit and is compressed, the resistance of the circuit will be gradually decreased, by insensible degrees, as more and more of the convolutions come into contact and short-circuit each other. If then the helix is all allowed to expand slowly, the thicker convolutions will first separate, and as the expansion of the helix continues the thinner convolutions will separate, so that the resistance of the circuit will be increased by insensible degrees until the whole resistance of the helix is in the circuit. This carbon helix may be made in a variety of ways; thus for instance a cylindrical or conical tube of carbon may be formed first, and a helical incision then made in the same from one end to the other; or the helix may be formed in the molding of the carbon, and then baked in a muffle in the ordinary way of manufacturing arc light carbons; or a helix may be wound from a suitable fibrous substance which may then be carbonized in the well known manner. Carbons of this kind can be made of any desired specific electrical resistance, and since the convolutions of the coil can be made quite close without touching, the whole coil when expanded offers a considerable resistance to a current passing through the same.

Into the screw hole 7 of the disk 1, is screwed a metal thimble 9, the upper portion of which is conical or parabolical in outline as shown, and may have an axial slot as indicated, so that its two parts will be slightly elastic, although this is not absolutely necessary. The lower portion of the thimble is formed into a tube 10, which is also split, and this tube constitutes the contact with one of the terminals of the lamp filament. The last convolution 8′ of the lower end of the helical rheostat is turned into the center of the helix, and has a perforation which is central with the axis of the helix; this perforation receives the conical portion of the thimble 9, which closely fits that perforation as shown in the drawings. To improve the electric contact between the thimble and the lower end of the coil, the latter may be plated with copper within the perforation which receives the thimble, in which case the thimble may also be soldered on to the lower end of the helix. If this is done, then the disk 1, is screwed on to the thimble instead of the thimble being screwed into the disk.

The block 2 is in effect a cylindrical inverted cup, through the bottom 11 of which, a slot 12 may be formed, for a purpose which will appear farther on. The interior of the block 2 has two distinct cylindrical portions, the upper one being narrower than the lower, as shown, so that at the junction of the two cylindrical portions there is a ledge 13. The lower and wider portion of the interior of the block 2, serves as a guide for the helix 8, the upper portion of which extends into the open end of the cup 2. A metal disk 14, the diameter of which is equal to that of the helix, is placed upon the upper end of the latter, so that when the helix rheostat is allowed to expand the disk 14 will finally come to bear upon the ledge 13, and thus limit the expansion of the helix. To the center of the disk 14, on the lower face thereof, are secured elastic metal fingers 15, by means of a screw bolt and a nut 16, and these fingers are so grouped that when the helix is compressed the conical portion of the thimble 9, enters between the spring fingers and makes electrical contact with the same. The helix rheostat is compressed and is allowed to expand by the operation of the cam 17, which is fast upon the spindle 17′ of a key 18. This spindle has its bearings in two brackets 19, 19, secured to the inner face of the bottom of block 2, one on each side of the slot 12, if such slot is used. This spindle is formed with a collar 20, two cylindrical journals, and square portion between the journals. The cam 16, is on the squared portion of the spindle, so as to turn with the latter, and a washer 21, and nut 22, serve, in connection with the collar 20, to produce any desired amount of friction upon the key, so that the latter will remain in any position to which it may be turned. The length of the brackets, 19, 19, and the size and eccentricity of the cam are such, that in one position of the key, the cam will be out of contact with the nut 16, as shown in Fig. 1, while when the key is turned from that position, in one direction, it will bear upon the nut 16, and compress the rheostat helix so that its convolutions come in contact with each other; when the key is turned ninety degrees, the maximum compression is obtained; this condition is represented in Fig. 2, and it will be seen that in this condition of the apparatus, the spring fingers 15 embrace and make contact with the conical or parabolical portion of the thimble 9. To avoid strain on the spiral a part of a single convolution may still remain open when the same is finally short-circuited. When the nut 22, is sufficiently tightened, the key will be held by friction in any intermediate position to which it may be turned. Stops 23, 24, formed on one of the brackets 19, are so placed as to limit the sweep of the cam to an arc of ninety degrees.

In place of a cam of the kind shown, one may be used with such curvature and eccentricity, as to require a sweep of one hundred and eighty degrees; in that case, when the cam is "off," it will extend into the slot 12, or in place of the slot, a simple groove or recess may be formed in the bottom of the block 2.

In the under side of the block 1, there is inlaid a metal ring 25, secured by two screws 26, 26, the projecting heads of which form the contacts for one terminal of the lamp filament, the screw-threaded tube 10 constituting the contact for the other terminal of the lamp filament or other translating device.

On the outer face of the bottom of the block 2, are secured two brackets 27, 28, each provided with a binding screw 29, for the reception of one of the leading wires, which enter the socket by fixture coupling 6, as in ordinary lamp sockets. One of these brackets 28, is connected by an insulated conductor 30, with the metal ring 25, the conductor passing through one of a number of holes formed in the metal disk 14, through the hollow of the helix rheostat and through a hole 31 in the block 1, as shown. The other bracket 27, is electrically connected with one of the brackets 19, by a bolt 32, which is the common fastening for brackets 27 and 19.

The circuit through the socket, when the helix rheostat is partly compressed, is as follows: from bracket 27, (with which one leading wire connects,) by bolt 32, bracket 19, cam 17, nut 16, disk 14, and through the rheostat, by thimble 9 to and through the lamp filament, from which the current proceeds by screws 26, ring 25, conductors 31, to bracket 28 and out by the other leading wire which connects with the same. When the key has been turned from the position represented in Fig. 1, just sufficient to bring the cam 17 in contact with nut 16, the current will pass through the long path offered by the whole length of the convolutions. In this case the maximum resistance will be in circuit, the minimum current will pass, and the lamp will show the faintest glow. If the key is then turned to any position intermediate between those represented in Figs. 1 and 2, respectively, some of the convolutions of the helix rheostat will be short-circuited upon each other, the resistance decreased, the current increased, and the glow of the lamp intensified. In a position of the cam slightly to the left of that shown in Fig. 2, very nearly all convolutions of the helix will be short-circuited upon each other, and when finally the cam reaches the extreme position shown in Fig. 2, contact is established between the spring fingers 15 and thimble 9, whereby a short circuit is formed around the rheostat helix, thus cutting out all resistance; the current is then at its maximum and the lamp at full incandescence. When the key is slowly turned back to its original position, contact between the spring fingers and the thimble is first broken, and the helix then expands until convolutions are again separated, whereby all the resistance of the circuit is increased by insensible degrees, until finally the cam breaks contact with nut 16, thus opening the circuit. When the helix rheostat is made of carbon, the radiating surface of the same is considerable, and only a slight increase of temperature will take place even if the whole resistance is left in circuit for several hours; to reduce even this comparatively harmless temperature, a series of ventilating holes 33, are formed around the periphery of the block 2, which register with similar holes 34, in the shell 3. Another series of ventilating holes 35, are made in the shell 3, immediately above the block 1, so that when the temperature of the rheostat rises, a current of air is caused to pass through the socket, tending to cool the same.

I have described one convenient form which my invention may assume, but it will be understood that I am not limited to this form, nor to the exact details of the construction shown, since the same may be largely varied without departing from the fundamental idea of my invention. It will also be understood, that the helical rheostat, the convolutions of which may be short-circuited upon each other by insensible degrees, and a short circuit around all of them, may be used for regulating the flow of current to any other translating devices than electric lamps; this rheostat, therefore, need not necessarily be used in connection with or housed in a lamp socket or holder for translating devices, but may be used independently of such socket or holder. It is particularly useful in connection with switches for regulating the flow of current to a group of lamps, and in all other cases where a graduated non-sparking resistance may be found desirable.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. A rheostat consisting of a helical conductor of low conductivity having convolutions of gradually increasing thickness, and means for compressing the helix and thereby short-circuit the convolutions upon each other by insensible degrees, substantially as described.

2. A rheostat consisting of a carbon helix having convolutions of gradually increasing thickness, and means for compressing the helix and thereby short-circuiting the convolutions upon each other by insensible degrees, substantially as described.

3. A current regulator, consisting of a helical conductor of low conductivity, combined with mechanism for short circuiting the convolutions of the helix upon each other by insensible degrees and then establishing a short circuit around the helix, substantially as described.

4. A current regulator, consisting of a carbon helix having convolutions of gradually increasing cross-section, combined with mechanism for short-circuiting the convolutions of the helix upon each other by insensible degrees and then establishing a short circuit around the helix, substantially as described.

5. In a regulating socket for incandescent electric lamps and other translating devices, a helical conductor of low conductivity housed in the socket, with means for including the helix in the circuit of the lamp and means for compressing the helix and thereby short-circuit its convolutions upon each other by insensible degrees, substantially as described.

6. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a helical conductor of low conductivity having convolutions of gradually increasing cross-section housed in the socket; with means actuated by the key of the socket for including the helix in the lamp circuit and for compressing the helix and thereby short circuit the convolutions of the same upon each other by insensible degrees, substantially as described.

7. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a carbon helix having convolutions of gradually increasing cross-sections, housed within the socket, with a key, and a cam actuated by the same, for including the helix in the lamp circuit and for compressing the helix, whereby the convolutions of the latter are short circuited upon each other by insensible degrees, substantially as described.

8. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a helical conductor of low conductivity housed within the socket, and a key and cam for including the helix in the circuit of the translating device and for compressing the helix, so as to short-circuit its

convolutions upon each other by insensible degrees; with two electric contacts, one for each end of the helix and constituting the terminals of a short-circuit around the helix, whereby the latter is short-circuited when compressed, substantially as described.

9. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a helical conductor of low conductivity having convolutions of gradually increasing cross-section, housed within the socket, and a key and cam for including the helix in the circuit of the translating device and for compressing the helix so as to short-circuit its convolutions upon each other by insensible degrees; with two electric contacts, one for each end of the helix and constituting the terminals of a short-circuit around the helix, whereby the latter is short-circuited when compressed, substantially as described.

10. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a carbon helix housed within the socket, and a key and cam for including the helix in the circuit of the translating device and for compressing the helix so as to short-circuit its convolutions upon each other by insensible degrees; with two electric contacts, one for each end of the helix and constituting the terminals of a short-circuit around the helix, whereby the latter is short-circuited when compressed, substantially as described.

11. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a carbon helix having convolutions of gradually increasing cross-section, housed within the socket, and a key and cam for including the helix in the circuit of the translating device and for compressing the helix so as to short-circuit its convolutions upon each other by insensible degrees; with two electric contacts, one for each end of the helix and constituting the terminals of a short-circuit around the helix, whereby the latter is short-circuited when compressed, substantially as described.

12. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a helical conductor of low conductivity housed within the socket, and a key and cam for including the helix in the circuit of the translating device and for compressing the helix so as to short-circuit its convolutions upon each other by insensible degrees; with two electric contacts at each end of and in the axis of the helix, and constituting the terminals of a short-circuit around the helix whereby the latter is short-circuited when compressed, substantially as described.

13. In a regulating socket for incandescent electric lamps and other translating devices, the combination of a helical conductor of low conductivity housed in the socket, means for compressing the helix, and a cup shaped block of insulating material in the socket, supporting the helix and compressing devices, and receiving and guiding one end of the said helix, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ELIAS E. RIES.

Witnesses:
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STEPHEN S. CLARK.